

1 OPTOELECTRIC MODULE WITH HANDLE-BASED  
2 DELATCHING MECHANISM

3  
4 CROSS-REFERENCE TO RELATED APPLICATIONS

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6 This application claims benefit to U.S. provisional  
7 application serial No. 60/401,576, filed August 6, 2002.

8  
9 FIELD OF THE INVENTION

10  
11 This invention relates to transceiver packages and more  
12 particularly to latching and delatching apparatus for the  
13 transceiver packages.

14  
15  
16 BACKGROUND OF THE INVENTION

17  
18 At the present time, optical-to-electrical and electrical-  
19 to-optical (hereinafter "optoelectric") packages, containing a  
20 pair of optoelectric modules, are contained in one common or  
21 standard package. The modules are generally used in pairs for  
22 two-way communication. Multiple optoelectric packages are used  
23 in a common mounting rack to provide multiple communication  
24 channels. The optoelectric packages are positioned in the rack  
25 in, for example, rows and columns and, to save space the

1 optoelectric packages are positioned as close together as  
2 possible.

3

4       Each optoelectric package is constructed to be inserted  
5 into an opening or cage in the rack. Once the optoelectric  
6 package is inserted completely into the cage, the optoelectric  
7 package is captured by means of a latch spring inside the cage  
8 that is positioned to engage a locking tab on the optoelectric  
9 package. To release the optoelectric package and remove it  
10 from the cage, the latch spring must be disengaged from the  
11 locking tab, after which the optoelectric package can be  
12 withdrawn from the cage.

13

14       The problems that arise result chiefly from the closeness,  
15 size and shape of the optoelectric packages. The optoelectric  
16 packages are generally oblong in shape with a multi-pin  
17 electrical plug or socket at the rear or inner end which mates  
18 with a multi-pin electrical socket or plug in the cage. The  
19 optoelectric package must nest snugly in the cage since any  
20 relative movement would eventually cause failures. However,  
21 because of the firm fit, withdrawal of the optoelectric package  
22 from the cage requires some effort. Because of the closeness  
23 of the multiple optoelectric packages in the rack, access to  
24 each optoelectric package is limited. Also, the latch spring

1 must be disengaged from the locking tab as the optoelectric  
2 package is withdrawn.

3

4 In one prior art solution a simple linear actuator is  
5 provided. The linear actuator is pushed forward to raise the  
6 latch spring in the cage to release it from the locking tab.  
7 For this design, the linear actuator is entirely located under  
8 the optoelectric package and, therefore, is difficult to  
9 access. That is, one must push the linear actuator forward  
10 with one hand to raise the latch spring and then grip and pull  
11 the optoelectric package. This combined pushing and pulling  
12 action, along with the need to firmly grip whatever portion of  
13 the optoelectric package is available for gripping, is very  
14 inconvenient.

15

16 Another solution used in the prior art uses a locking tab  
17 on the end of a lever spring. This, solution requires a  
18 different rack and cage arrangement. Instead of moving the  
19 latch spring (as described above) in the cage, the locking tab  
20 is displaced to clear the latch and unlock the optoelectric  
21 package. Springs can be unreliable. For example, the spring  
22 can be bent or deformed by repeated use and will no longer  
23 effectively lock the optoelectric package into the cage.

1 BRIEF DESCRIPTION OF THE DRAWINGS

2  
3 The foregoing and further and more specific objects and  
4 advantages of the instant invention will become readily  
5 apparent to those skilled in the art from the following  
6 detailed description of a preferred embodiment thereof taken in  
7 conjunction with the following drawings:

8  
9 FIG. 1 is a front-top isometric view of an optoelectric  
10 cage;

11  
12 FIG. 2 is a front-top isometric view of the optoelectric  
13 module used in the prior art;

14  
15 FIG. 3 is a side-top isometric view of an optoelectric  
16 module in accordance with the present invention, with a handle  
17 in a locked orientation;

18  
19 FIG. 4 is a side-top isometric view of an optoelectric  
20 module in accordance with the present invention, with the  
21 handle in an unlocked orientation;

22  
23 FIG. 5 is an isometric view of the handle in accordance  
24 with the present invention; and

1        FIG. 6 is an isometric view of a slide in accordance with  
2   the present invention.

1                    DETAILED DESCRIPTION OF THE DRAWINGS

2  
3            Turning now to FIG. 1, an optoelectric cage 10 is  
4 illustrated. Optoelectric cage 10 is designed to hold an  
5 optoelectric module (See FIG. 2) which slides into an opening  
6 14. The optoelectronic module can be slid rearward a distance  
7 13 as determined by tabs 11. Spring fingers 12 are positioned  
8 on cage 10 to hold the optoelectronic module firmly in place,  
9 as will be discussed presently.

10  
11           Turn now to FIG. 2 which illustrates a prior art  
12 optoelectric module 20. Module 20 includes an elongated  
13 housing 22 with a rear end 26 which makes contact with tabs 11  
14 when module 20 is inserted into cage 10. Housing 22 includes a  
15 header 24, which is typically formed of a single piece and may  
16 be manufactured by some convenient means, such as molding or  
17 the like. Header 24 is mated with the elongated portions of  
18 housing 22 and includes a pair of openings 25 designed to  
19 receive an optical-to-electrical module (not shown) in one side  
20 and an electrical-to-optical module (not shown) in the other  
21 side.

22  
23           Module 20 further includes detents 23 which engage spring  
24 fingers 12 so that module 20 is held firmly within cage 10 to  
25 minimize vibrations and other such movement which can affect

1 the performance and alignment of module 20. As such, removing  
2 module 20 from cage 10 poses problems because spring fingers 12  
3 are typically difficult to disengage from detents 23 due to  
4 space limitations.

5  
6 Turning now to FIG. 3, an optoelectric module 30 in  
7 accordance with the present invention is illustrated.  
8 Optoelectric module 30 includes an elongated housing 32 with a  
9 length 13 such that module 30 can be placed within cage 10. In  
10 this embodiment, elongated housing 32 is formed of metal and  
11 includes detents 46 positioned to frictionally engage an inner  
12 surface of a cage in a mounting rack (not shown), such as  
13 spring fingers 12 (See FIG. 1). Detents 46 ensure a positive  
14 contact between optoelectric module 30 and cage 10 to prevent  
15 relative movement, once optoelectric module 30 is properly  
16 nested in cage 10, and ensures that cage 10 and optoelectric  
17 module 30 are electrically connected. Further, elongated  
18 housing 32 includes tracks 36 whose function will be discussed  
19 separately.

20  
21 Elongated housing 32 includes a header 43, which in this  
22 embodiment is formed of a single piece and may be manufactured  
23 by some convenient means, such as molding or the like. Header  
24 43 is mated with the elongated portions of housing 32 and  
25 includes a pair of openings 44 designed to receive an optical-

1 to-electrical module (not shown) in one side and an electrical-  
2 to-optical module (not shown) in the other side. Optoelectric  
3 package 30 may have either the plug or socket of a multipin  
4 electrical connector at the rear end (not shown), which plug or  
5 socket is positioned to mate with a socket or plug in the  
6 mounting rack when the optoelectric package is properly nested  
7 in the cage of the mounting rack. In this embodiment, it is  
8 anticipated that each module includes a printed circuit board  
9 with multiple contacts formed on a rearwardly extending  
10 surface. Each of the modules may electrically connect to the  
11 multipin electrical connector at the rear end (not shown) of  
12 elongated housing 32 when the modules are properly inserted  
13 into openings 44.

14

15 In the preferred embodiment, a handle-based delatching  
16 mechanism 45 is attached to elongated housing 32 and header 43.  
17 Handle-based delatching mechanism 45 includes a handle 31 and a  
18 slide 34. In the preferred embodiment, handle 31 is formed as  
19 a separate assembly and attached to header 43 during a final  
20 assembly. In the preferred embodiment, handle 31 includes a  
21 ramp 38 which is used to disengage spring fingers 12 (See FIG.  
22 1) as will be discussed separately. In the preferred  
23 embodiment, ramp 38 is formed by bending handle 34 as shown.  
24 However, it will be understood that handle 31 can include other  
25 means to disengage spring fingers 12.



1        Handle 31 is attached to header 43 using pins attached to  
2 header 43 (not shown) which can mate with openings 35. Handle  
3 31 is pivotally mounted in header 43 for movement between a  
4 closed position, illustrated in FIG. 3, and an open position,  
5 illustrated in FIG. 4, as handle 31 is moved in a direction 37.  
6 In this preferred embodiment, handle 31 is formed from metal,  
7 which is sturdy and easy to form. However, it will be  
8 understood that handle 31 can be formed from other suitable  
9 materials, such as plastic or the like.

10

11        In the preferred embodiment, handle 31 is attached to  
12 slides 34 through tabs 40 (See FIG. 6) formed from openings 33  
13 wherein tabs 40 interlock with slots 41 (See FIG. 6). However,  
14 it will be understood that handle 31 can be attached to slides  
15 34 through other means well known to those skilled in the art,  
16 such as a screw or the like. Slides 34 are positioned within  
17 tracks 36 of elongated housing 32 which allows slides 34 to  
18 move in a direction 39.

19

20        As lever arm 31 moves from the closed position to the open  
21 position along direction 37, slide 34 moves along tracks 36 in  
22 direction 39. Ramp 38 engages spring fingers 12 (not shown) to  
23 disengage optoelectric module 30 from cage 10. Hooks 42 slide  
24 forward to interlock with elongated housing 32. Handle 31 can  
25 then be used to easily withdraw module 30 from opening 14.

1        While a handle-based delatching mechanism is illustrated  
2 in conjunction with a specific optoelectric module 30, it will  
3 be understood that it may be used with other optoelectric  
4 packages and may be incorporated as an integral portion or  
5 added during assembly. Also, while a specific handle 31 and  
6 slide 34 are illustrated and described, it will be understood  
7 that other embodiments may be devised which essentially perform  
8 the same functions.

9  
10       Thus, handle-based delatching mechanism 45 improves the  
11 delatching feature because handle 31 is in an unobstructed  
12 position and accessibility is greatly increased. Also, handle  
13 31 and slide 34 are formed of sturdy and reliable material  
14 which greatly increases the life and reliability of the  
15 assembly. Handle 31 not only allows the unlatching of  
16 optoelectric package 30 but provides a convenient sturdy grip  
17 for the removal of optoelectric package 30 from cage 10 so that  
18 packing density is no longer a problem.

19  
20       Various changes and modifications to the embodiments  
21 herein chosen for purposes of illustration will readily occur  
22 to those skilled in the art. To the extent that such  
23 modifications and variations do not depart from the spirit of  
24 the invention, they are intended to be included within the

1 scope thereof which is assessed only by a fair interpretation  
2 of the following claims.

3

4       Having fully described the invention in such clear and  
5 concise terms as to enable those skilled in the art to  
6 understand and practice the same, the invention claimed is: